20CS3301/20IT3301-Fundamentals of Digital Logic Design

Micro Syllabus

Offering Branches	CSE, IT		
Course Category:	Program Core	**Credits:**	3
Course Type:	Theory	**Lecture-Tutorial-Practical:**	3-0-0
Prerequisites:	Basic number System Basic Electrical & Electronics Engg. (PCC1)	**Continuous Internal Evaluation:**	30
		Semester End Evaluation:	70
		Total Marks:	100

Course Outcomes

Upon successful completion of the course, the student will be able to:

CO1	Understand the basic concepts of digital circuits.	**L2**
CO2	Apply minimization techniques to simplify Boolean expressions.	**L3**
CO3	Apply the principles of digital electronics to design combinational and sequential circuits.	**L3**
CO4	Analyze the functionality of combinational circuits and sequential circuits.	**L4**

Course Content

UNIT-1	**Digital Systems and Binary Numbers:**
	➢ **Digital Systems**
	➢ **Binary Numbers**
	➢ **Number Base–Conversions**
	  ➢ Binary, Decimal, Octal and Hexa Decimal Number System conversions.
	➢ **Octal and Hexadecimal Numbers**
	➢ **Complements of Numbers**
	  ➢ Subtraction with Complements
	  ➢ 1's,2's,9's and 10's complements subtraction.
	➢ **Signed Binary Numbers**
	  ➢ Arithmetic Addition
	  ➢ Arithmetic Subtraction
	➢ **Binary codes**
	  ➢ Binary-Coded Decimal Code
	  ➢ BCD Addition, Subtraction
	  ➢ Excess-3 Code
	  ➢ Gray Code
	➢ **Binary Logic:**
	  ➢ Definition of Binary Logic
	  ➢ Logic Gates- Basic Gates
		CO1

	➢ Truth Tables	
UNIT-2	**Boolean Algebra:** ➢ **Introduction** ➢ **Basic Definitions** ➢ **Axiomatic definition of Boolean Algebra** ➢ Two-Valued Boolean Algebra ➢ **Basic theorems and properties of Boolean Algebra** ➢ Duality ➢ Basic Theorems ➢ **Boolean functions** ➢ Algebraic Manipulation ➢ Complement of a Function ➢ **Canonical and Standard Forms** ➢ Minterms and Maxterms ➢ Sum of Minterms ➢ Product of Maxterms ➢ Conversion between Canonical Forms ➢ Standard Forms **Gate–Level Minimization:** ➢ **Introduction** ➢ **Map Method-** ➢ Two-Variable K-Map ➢ Three-Variable K-Map ➢ **Four Variable K-Map** ➢ Prime Implicants ➢ **Product of Sums Simplification** ➢ **Don't Care Conditions** ➢ **NAND and NOR implementation** ➢ NAND Circuits ➢ NOR Implementation	**CO1,CO2**
UNIT-3	**Combinational Logic:** ➢ **Introduction** ➢ **Combinational Circuit** ➢ **Analysis Procedure** ➢ **Design Procedure** ➢ Code Conversion Example ➢ **Binary adder – subtractor** ➢ Half Adder ➢ Full Adder ➢ Binary Adder ➢ Carry Propagation ➢ Binary Subtractor ➢ **Decimal Adder** BCD Adder	**CO1, CO3, CO4**

	➢ **BCD to Seven Segment Display** ➢ **Encoders** ➢ Priority Encoder ➢ **Decoder** ➢ **Multiplexers** ➢ Boolean Function Implementation ➢ **Demultiplexers.**	
UNIT-4	**Synchronous Sequential Logic:** ➢ **Introduction** ➢ **Storage Elements :Latches** ➢ SR Latch ➢ D Latch ➢ **Storage Elements :Flip-Flops** ➢ Flip-Flops –Truth Tables ➢ SR Flip Flop ➢ JK Flip Flop ➢ D Flip Flop ➢ T Flip Flop ➢ Characteristic Tables ➢ Characteristic Equations ➢ Excitation Table	**CO1, CO3, CO4**
UNIT-5	**Registers and Counters:** ➢ **Registers** ➢ Register with Parallel Load ➢ **Shift Registers** ➢ Serial Transfer ➢ Serial Addition ➢ Universal Shift Register ➢ **Ripple Counters** ➢ Binary Ripple Counter ➢ BCD Ripple Counter ➢ **Synchronous Counters** ➢ Binary Counter ➢ Up–Down Binary Counter ➢ BCD Counter ➢ Binary Counter with Parallel Load ➢ **Other Counters:** ➢ Ring counter ➢ Johnson counter.	**CO1, CO3, CO4**
Learning Resources		
Text Books	1. Digital Design, M. Morris Mano, Michael D.Ciletti, Fifth Edition, 2013, Pearson.	
Referenc eBooks	2. Switching Theory and Finite Automata, Zvi. Kohavi, Niraj K. Jha, Third Edition, 2010, Cambridge University Press. 3. Fundamentals of Digital circuits, A. Anand Kumar, Third Edition, 2013, PHI.	

e-Resources & other	4. https://nptel.ac.in/courses/106/108/106108099/ 5. http://nptel.ac.in/courses/117106086/1
digital material	6. https://nptel.ac.in/courses/117/105/117105080/ 7. https://www.udemy.com/course/digital-electronics-logic-design/ 8. https://learnabout-electronics.org/Digital/dig20.php 9. https://www.tutorialspoint.com/digital_circuits/digital_circuits_logic_gates.htm 10. https://www.geeksforgeeks.org/digital-electronics-logic-design-tutorials/

Course Coordinators

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2. Dr B Lakshmi Ramani
3. Mr P Anil Kumar

Course Coordinators

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